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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,986	12/06/2004	Joseph B. Kejha	1391P	7127

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EXAMINER	
BEST, ZACHARY P	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,986	KEJHA ET AL.	
	Examiner	Art Unit	
	Zachary Best	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,4-10,12-17 and 20-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,4-10,12-14 and 21-24* is/are rejected.

7)☒ Claim(s) *20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

LITHIUM BASED ELECTROCHEMICAL DEVICES HAVING A CERAMIC SEPARATOR GLUED THEREIN BY AN ION CONDUCTIVE ADHESIVE

Examiner: Z. Best S.N. 10/516,986 Art Unit: 1795 September 9, 2008

DETAILED ACTION

1. Applicant's amendment filed on July 14, 2008 was received. Claims 1, 3, 11, and 18-19 were cancelled. Claims 2, 4-10, 12-17, and 20-21 were amended. Claims 22-24 were newly added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action issued on February 27, 2008.

Specification

3. The objection to Claims 18-19 as failing to provide proper antecedent basis is withdrawn because Claims 18-19 have been cancelled.

Claim Objections

4. The objections to Claims 1, 10, 12, and 18 are withdrawn because the affected Claims have been amended or cancelled.

5. Claims 20 is objected to because the using the ranges given, the mixture will at times amount to a sum greater than 100 wt. % when using the maximum amount of one

component and the minimum amounts of the remaining components. For example, in Claim 20 if the dimethoxyethane is set to the maximum claimed amount (95 wt.%), polyvinylidene fluoride/hexafluoropropylene is set to the minimum claimed amount (5 wt.%), and the lithium based electrolyte is set to the minimum claimed amount (10 wt.%), then the mixture will weigh 110 wt%. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The rejections under 35 U.S.C. 112, second paragraph of Claims 1 and 19 are withdrawn because Claims 1 and 19 have been cancelled.

Claim Rejections - 35 USC § 103

11. Claims 2, 4, 9-10, 12-17, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. (US 6,387,565 B1) in view of Hikmet (US 6,558,840 B1), Gozdz et al. (US 5,554,459 A), and Shibuya et al. (US 6,291,098 B1).

Regarding Claim 22, Aihara et al. teach a lithium based electrochemical device comprising two electrodes (col. 6, line 57 – col. 7, line 18), which are porous (col. 4, lines 26-37), said electrodes including current collectors the active materials with binders coated thereon (col. 6, line 57 to col. 7, line 3), at least one separator between said electrodes (Aihara et al. claim 1), said separator having one side in bonding contact with said first electrode active material (Aihara et al. claim 1), an organic ion-conductive adhesive layer on the other side of said separator in adherent contact with said separator and said other

electrode (Aihara et al. claim 1), a non-aqueous electrolyte in contact with said electrodes and said separator (Aihara et al. claim 1), and an enclosure surrounding and containing said device (col. 1, lines 39-45). However, Aihara et al. fail to specifically teach the current collectors comprise expanded metal microgrids, the separator is a porous ceramic separator, or the enclosure is a moisture-proof enclosure with exiting sealed terminals extending therefrom.

Hikmet teaches a porous ceramic separator (col. 1, lines 49-65) containing electrically insulating particles and a binder (col. 3, lines 45-55) for a lithium battery (col. 2, lines 61-62), wherein it is advantageous to use said ceramic separator because it is not susceptible to crack-formation and disintegration (col. 1, lines 44-47). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the porous ceramic separator of Hikmet because said ceramic separator is not susceptible to crack-formation and disintegration.

Gozdz et al. teach an electrically-conductive collector element (current collector) for use in a lithium battery (abstract) wherein the current collector is a foil (12 or 16), preferably an expanded metal microgrid (col. 3, lines 1-6), wherein it is advantageous to use said current collector because it maintains the integrity of a strong physical electrically-conductive bond (col. 1, lines 52-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the expanded metal microgrid of Gozdz et al.

because said expanded metal microgrid the integrity of a strong physical electrically-conductive bond.

Shibuya et al. teaches a moisture proof enclosure (4) surrounding and containing a lithium electrochemical cell (see col. 7, lines 42-45) with exiting sealed terminals (5 and 6) extending thereform (fig. 3), wherein it is advantageous to use said enclosure because of the superior air-tightness and mechanical strength (col. 1, lines 58-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the lithium based electrochemical device of Aihara et al. wherein the device comprises the enclosure of Shibuya et al. because enclosure has superior air-tightness and mechanical strength.

Regarding Claim 2, Aihara et al. teach said electrodes are an anode and a cathode (Aihara et al. claim 1).

Regarding Claim 4, Hikmet teach said particles are alumina particles (col. 2, lines 35-42).

Regarding Claim 9, Aihara et al. teach said adhesive is PVDF homopolymer (col. 6, lines 6-17) based and contains at least one aprotic liquid (N-methylpyrrolidone, col. 7, lines 54-59) and at least one salt (col. 5, lines 33-38). N-methylpyrrolidone is an aprotic organic solvent as evidenced by Chen et al. (U.S. Patent No. 5,741,609 A, col. 4. lines 25-33).

Regarding Claim 10, Hikmet teaches the electrolyte for a lithium battery comprising ethylene carbonate and diethyl carbonate in equal proportions (col. 4, line 2). It is

Examiner's position that the electrolyte of Hikmet has a high boiling point and is essentially non-flammable.

Regarding Claim 12, Aihara et al. teach the separator binder is of a different polymer than electrodes' binders (col. 7, lines 1-5, electrode binder is PVDF, separator binder is PP/PE/PP).

Regarding Claims 13-16, in view that the combined teaching provides for the claimed elements it is reasoned that the elements are capable of acting as a bi-cell, capacitor, supercapacitor, or double layer capacitor.

Regarding Claim 17, Aihara et al. teach that at least one electrode is smaller than said separator (col. 7, lines 11-14).

Regarding Claim 21, Aihara et al. teach that said separator is coated with an adhesive that is a mixture of polyvinylidene fluoride in a range of 5-10 wt.% (col. 7, lines 54-59 and col. 8, lines 27-32).

Regarding Claim 23, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach the electrochemical device as stated above. It is noted that Claim 23 is a product-by-process claim. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985). The battery taught by et al. in view of Hikmet, Gozdz et al., and Shibuya et al. is obvious to that of Applicant's, and therefore, Applicant's process is not given patentable weight in this claim.

12. Claims 5-7 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. as applied to Claims 2, 4, 9-10, 12-17, 21, and 23 above, and in further view of Yun et al. (US 7,279,251 B1).

Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach a lithium-based electrochemical device as recited in paragraph 11 above. However, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. fail to teach a separator containing fluoride particles.

Regarding Claim 5, Yun et al. teach a secondary battery with a separator comprising inorganic lithium fluoride particles (col. 4, lines 20-25). Yun et al. teach it is advantageous to add a filling agent to a separator because of improved porosity and mechanical strength (col. 4, lines 18-20). Yun et al. further teach the functional equivalency of the addition of either LiF or Al_2O_3 to the separator (col. 4, lines 18-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the electrochemical device of Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. with a porous ceramic separator comprising inorganic lithium fluoride particles because Yun et al. teach resultant improved porosity and mechanical strength of the separator. Alternatively, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute lithium fluoride for alumina in the electrochemical device of Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. because Yun et al. teach functional equivalency of the particles as inorganic filler in a separator.

Regarding Claim 6, Yun et al. teach a separator comprising inorganic fluoride particles (col. 4, lines 20-25).

Regarding Claim 7, Yun et al. teach a separator comprising inorganic fluoride and alumina particles (col. 4, lines 20-25).

Regarding Claim 24, Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach the electrochemical device as stated above. It is noted that Claim 23 is a product-by-process claim. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985). The battery taught by Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. in view of Yun et al. is obvious to that of Applicant's, and therefore, Applicant's process is not given patentable weight in this claim.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. as applied to Claims 2, 4, 9-10, 12-17, 21, and 23 above, and in further view of Coustier et al (US 2002/0110732 A1).

Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. teach an electrochemical device as recited in paragraph 11 above. However, Aihara et al. and Arrance et al. fail to teach said adhesive is a PVDF/HFP copolymer.

Coustier et al. teach an electrochemical cell having a binder (adhesive, 105) to enhance the bonding of the electrochemical cell's components to each other (par. 23), and Coustier et al. further teach the functional equivalency of PVDF and PVDF/HFP (colpar. 28) for us as said binder (adhesive). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the electrochemical

device as taught by Aihara et al. in view of Hikmet, Gozdz et al., and Shibuya et al. wherein the PVDF/HFP is substituted for PVDF as a base for the adhesive because Coustier et al. teach the functional equivalency of PVDF homopolymer and PVDF/HFP copolymer for use as an adhesive material in an electrochemical cell.

Response to Amendment

14. Applicant's arguments filed on July 14, 2008 have been fully considered, but they are not persuasive.

Applicant argues:

(a) Aihara et al. does not contemplate an outer case;

(b) Aihara et al. is different from Applicant's invention on the grounds that the Aihara et al. is a porous adhesive;

(c) Yun et al. is not analogous art because it uses a fibrous polymer separator film.

In response to Applicant's arguments:

(a) Aihara et al. specifically note that the invention is applicable to many different configurations of batteries as long as the battery body comprises a positive electrode, a negative electrode, a separator, and an adhesive resin joining the positive and the negative electrodes to the separator (col. 6, lines 23-36). Therefore, it is reasoned that the elements of Aihara et al. could easily be configured to be placed in an outer case, such as that taught by Shibuya et al.

(b) The constraint of a "**non-porous** polymeric adhesive" is not claimed. Furthermore, Examiner can find no discussion of a **non-porous** polymeric adhesive within the instant specification.

(c) Hikmet teaches the separator comprising a polyolefin compound, such as polyethene (polyethylene) or polypropene (polypropylene) and Al_2O_3 (col. 2, lines 1-42). Yun et al. teaches a separator comprising polyethylene or polypropylene (col. 3, lines 46-61) and Al_2O_3 or LiF (col. 4, lines 18-25). Therefore, the separator of Hikmet and Yun et al. have generally the same chemistry. It is noted that Yun et al. teaches that its separator generally will have less than 20% of the ceramic filler (col. 4, lines 23-24); however, Yun et al. words it in a manner which suggests that one skilled in the art, thereby knowing of the separator of Hikmet, would understand when a greater amount could be utilized.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee

pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zpb

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795